



Comments on Papers by Carlo Carraro and Richard Newell

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Climate Change Policy:
Insights from the U.S. and Europe

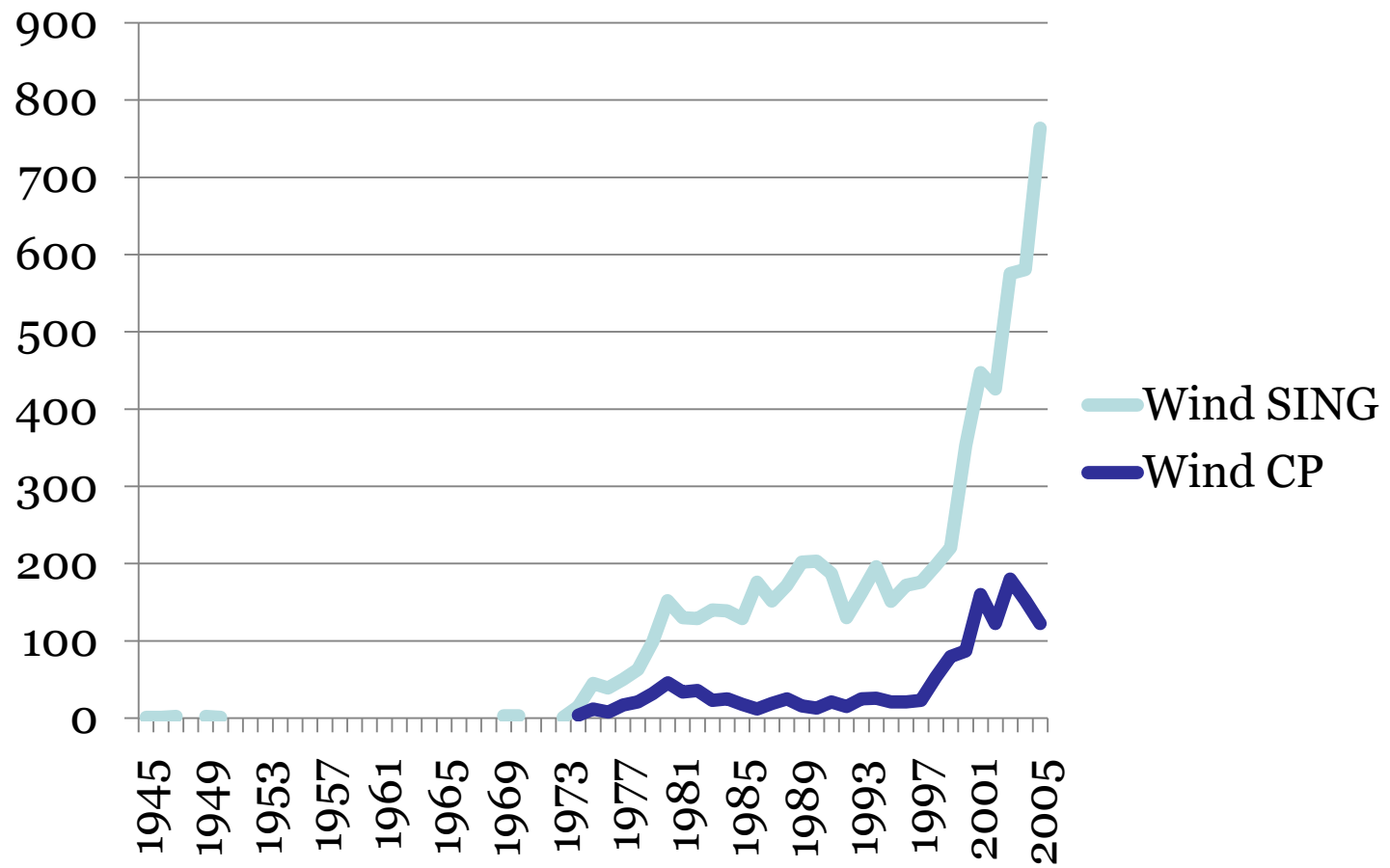
March 23rd – 24th, 2009

Climate Change Mitigation Technologies Covered

- The empirics of backstop technologies – past and future
- The importance of policy stability in encouraging innovation in environmental/climate technologies
- The importance of policy flexibility in encouraging transfer of environmental/climate technologies
- The importance of coordinated international efforts to address climate change

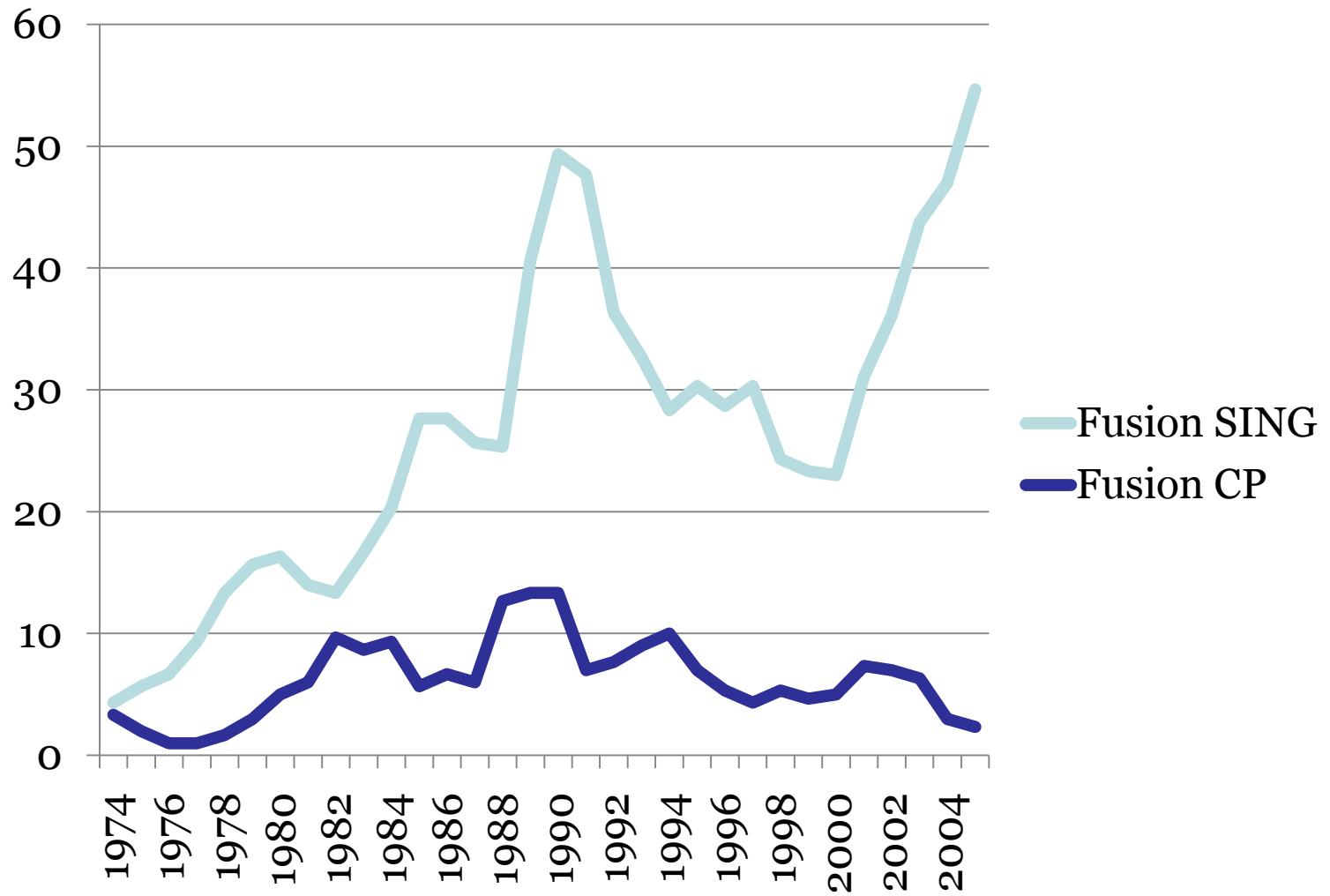
Backstops – Past

(Patent Applications – Singulars and Claimed Priorities)



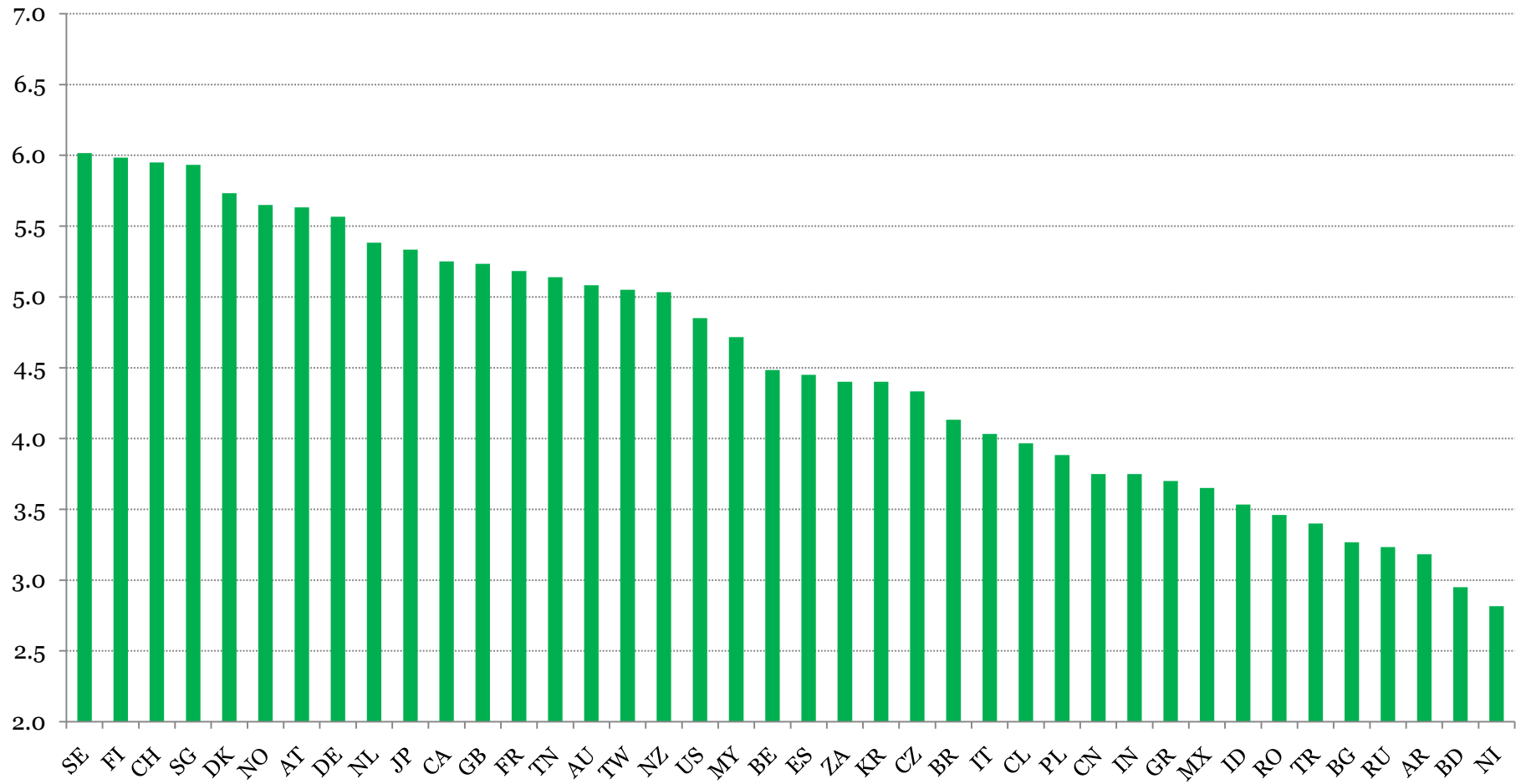
Backstops – Future

(Patent Applications – Singulars and Claimed Priorities)



Stability and Transparency of Environmental Policy Regimes

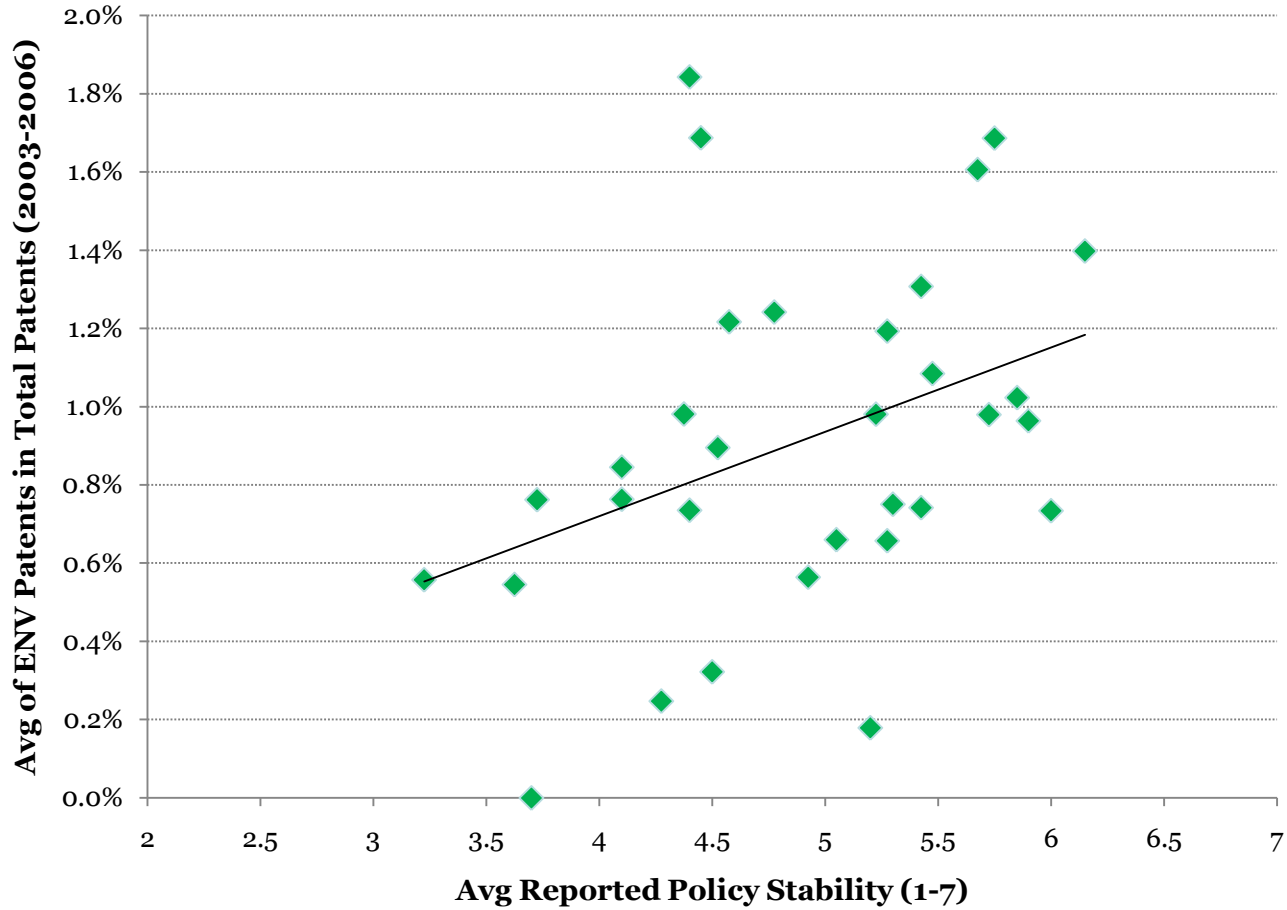
(Mean value of the index over 2001-2006)



Survey question: Environmental policies in your country are 1 = confusing and frequently changing, 7 = transparent and stable.

Source: <http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>

Policy Stability and Innovation



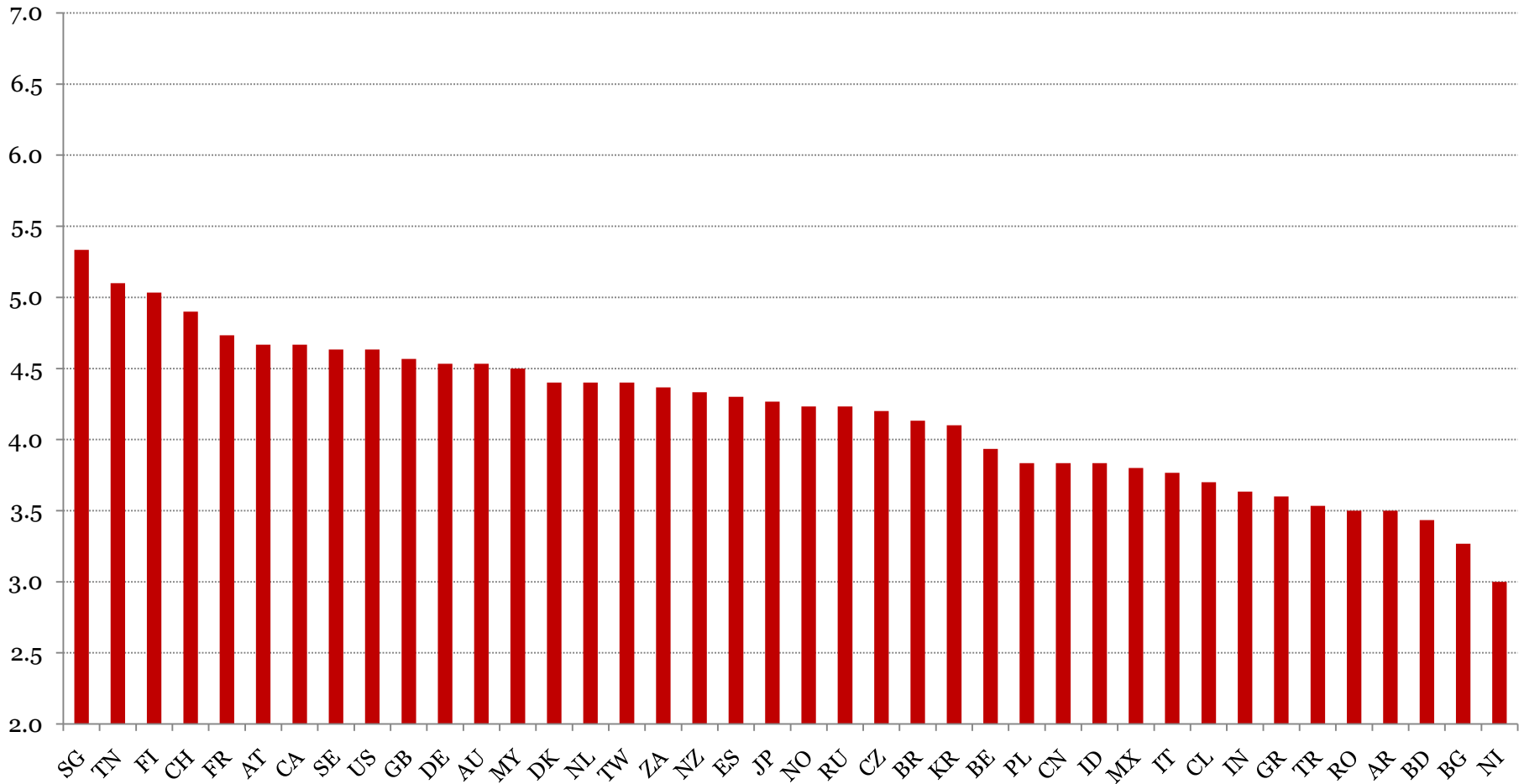
Policy Stability / Stringency and Innovation

(Negative binomial regression with country fixed effects)

Dependent variable: PATENTS_AWW	Coef.
Policy Stability (WEF_STAB)	1.3964* (0.033)
Pollution Abatement and Control Expenditures (PACE_Private)	0.3052** (0.002)
Government Expenditures on Environmental R&D (GBAORD_env)	12.6307** (0.005)
Gross Domestic Expenditures on R&D (GERD_total)	0.1240 (0.208)
Total Patents (PATENTS_EPO_totals)	0.0162*** (0.000)
Intercept	-4.669 (0.177)

Flexibility of Environmental Policy Regimes

(Mean value of the index over 2001-2003)



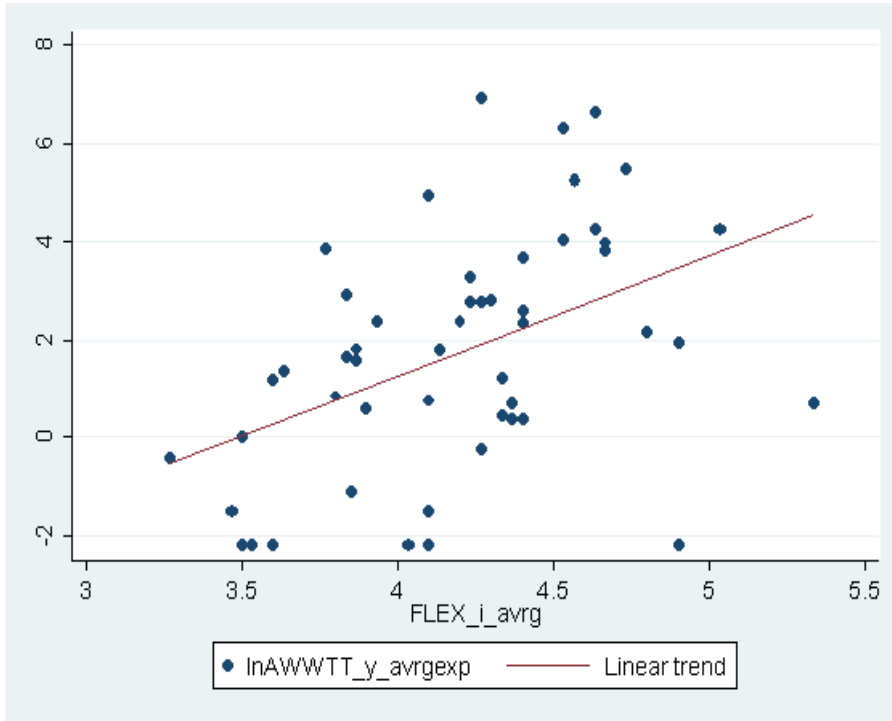
Survey question: Environmental policies in your country are with 1 = offer no options for achieving compliance, 7 = are flexible and offer many options for achieving compliance.

Bilateral Transfer Relations

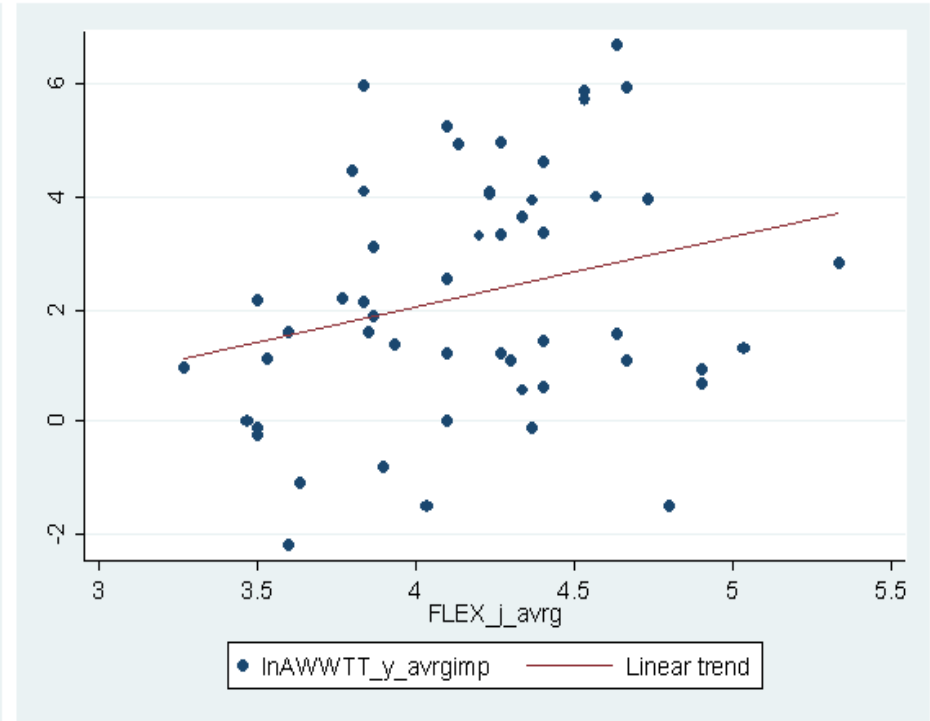
(Number of duplicate patent filings in AWW-relevant fields as a share of total transfer, 2001-2003)

Source country	Recipient country	AWW Transfer	Total Transfer	Share
JP	PL	36	191	18.85%
NL	BE	7	61	11.48%
CZ	SK	8	76	10.53%
AT	MX	8	90	8.89%
CN	HK	10	122	8.20%
AT	PL	9	114	7.89%
NO	MX	5	64	7.81%
FI	MX	11	142	7.75%
PL	AU	15	212	7.08%
CZ	AU	6	85	7.06%
RU	UA	8	115	6.96%
FI	NO	18	259	6.95%
JP	ZA	17	246	6.91%
FI	PL	9	132	6.82%
KR	SG	4	60	6.67%
GR	AU	6	92	6.52%
CA	NZ	4	62	6.45%
UA	RU	19	299	6.35%
GB	IE	6	97	6.19%
AU	NZ	46	761	6.04%
CA	KR	5	83	6.02%
AT	BR	11	183	6.01%

Policy Flexibility and Technology Transfer



Corr ('Exports', Flex)=0.45



Corr ('Imports', Flex)=0.26

Policy Flexibility and Transfer

(Negative binomial regression)

Dependent variable: $AWWTT_{ijt}$	using $FLEX_{jt}$ t=2001-03		using $FLEX_{j_avg}$ t=1998-06 t=2001-06	
	(1)	(2)	(3)	(4)
Policy Flexibility ($FLEX_{it}$ or $FLEX_{i_avg}$)	1.3657*** (0.000)	0.2204 (0.102)	2.1638*** (0.000)	0.5966*** (0.000)
Policy Flexibility ($FLEX_{jt}$ or $FLEX_{j_avg}$)	1.0634*** (0.000)	0.6256*** (0.000)	1.4522*** (0.000)	1.1998*** (0.000)
Policy Stringency ($STRNG_{it}$)		0.8262*** (0.000)		0.6698*** (0.000)
Policy Stringency ($STRNG_{jt}$)		0.3354*** (0.000)		0.1202* (0.047)
Available Stock of Inventions ($AWWSTOCK_{it}$)	0.0004*** (0.000)	0.0003*** (0.000)	0.0003*** (0.000)	0.0003*** (0.000)
Absorptive Capacity ($AWWPAT_{jt}$)	0.0012*** (0.000)	0.0012*** (0.000)	0.0011*** (0.000)	0.0011*** (0.000)
Total Technology Transfer ($TOTALTT_{ijt}$)	0.0042*** (0.000)	0.0026*** (0.000)	0.0044*** (0.000)	0.0028*** (0.000)
Intercept	-13.2789*** (0.000)	-12.1151*** (0.000)	-18.6560*** (0.000)	-14.7467*** (0.000)
N	21822	21822	90900	37200
Log pseudolikelihood	-5757.94	-5548.51	-15888.29	-8035.44
(Prob > Chi2)	0.000	0.000	0.000	0.000

P-values in parentheses, based on robust standard errors. * p<0.05, ** p<0.01, *** p<0.001

Top Ten Source and Recipient Countries

(Number of duplicate patent filings, 1985-2004)

Recipient	US	DE	JP	CN	CA	KR	AU	BR	TW	GB
Source										
JP	6504	2641	-	2040	505	1891	412	67	902	302
DE	3589	-	1976	938	772	380	441	509	111	476
US	-	1815	1826	823	1925	370	818	460	206	375
GB	780	526	350	149	291	65	205	88	24	-
KR	812	69	777	619	14	-	48	5	74	33
FR	363	389	186	99	190	43	101	98	9	13
IT	210	199	89	59	49	9	34	67	8	22
NL	140	145	65	45	69	13	54	34	2	7
AT	115	228	44	24	32	10	30	20	3	5
SE	113	95	23	28	47	6	48	27	4	5

Bilateral Transfer Relations

(Number of duplicate patent filings in climate change-relevant fields as a share of overall transfer, 1985-2004)

Source country	Recipient country	Share
DK	CZ	12.20%
AT	NO	11.70%
NL	HU	11.11%
DK	CN	9.15%
DE	MA	8.89%
CH	KR	8.43%
NO	KR	7.69%
BE	CN	7.50%
MX	AU	6.67%
AU	ID	5.56%
AT	PL	5.50%
CH	FI	5.49%
CN	DE	5.41%
DK	CA	5.32%
AT	DK	5.26%
AU	TW	5.26%
DE	EE	5.26%
DK	PL	5.10%
US	IS	5.08%
ES	PT	5.00%

Climate Change Policies and Transfer

(Negative binomial regression, with fixed effects)

Dependent variable: CCTT_ijt	<i>i</i> = Annex1 <i>j</i> = non-Annex1 with DNAs <i>t</i> = post-2000
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Degree of Involvement in CDM Projects (CDM_ijt)	3.97E-07* (0.050)
Absorptive Capacity (CCPAT_ijt)	2.40E-03*** (0.000)
Available Stock of Inventions (ASTOCK_it)	6.41E-04*** (0.000)
Electricity Consumption (CONS_ijt)	2.16E-06*** (0.000)
Total Technology Transfer (TOTALTT_ijt)	8.38E-04 (0.136)
Intercept	-6.5121*** (0.000)
N	8440
Log pseudolikelihood	-509.47
(Prob > Chi2)	0.000
